

**Educational Product** 

Educators & Students

Grades 5-12

ET-2004-10-119-ARC

# **Educational Topic**

# **Research Engineer - Icing Research**

#### **Related Job Titles:**

Aerospace Engineer, Aeronautics Engineer, Meteorological Aviation Engineer

#### **Job Description:**

A Research Engineer performing icing research in the refrigerated wind tunnel creates and conducts experiments that help pilots and aircraft manufacturers understand more about in-flight icing and its effects on flight characteristics of an airplane. Sometimes the work of Icing Researchers might take them onboard an icing research aircraft for the Ice-Contaminated Tailplane Stall program. This researcher uses very sophisticated computer equipment to take measurements of the forces that are affected by icing on surfaces of an airplane. After creating and running the experiment, icing researchers then draft their report and present the information to other researchers, as well as aeronautical societies, aircraft manufacturers, and pilots. Their results greatly inform pilots about when to expect airframe icing, what icing feels like to the pilot at the controls, how an airplane reacts to different types of icing, and how a pilot should react to the different types of icing.

#### Interests / Abilities:

- Do like to think of multiple explanations for why something happened the way it did?
- · Do you love aviation and aeronautics?
- · Do you like to observe things in great detail?
- Do you enjoy math?
- Do you find it easy to read and understand mathematical graphs and charts?

#### **Suggested School Subjects / Courses:**

- Math (algebra, trigonometry)
- Statistics
- Meteorology
- Physics
- English composition
- · Computer science

## Education / Training Needed:

To perform research, a Masters or Ph.D. level of degree in any of the following: Aeronautical Engineering, Aerospace Engineering, Mechanical Engineering, or Fluid Dynamics (the study of how air flows around an object) from an accredited college or university is required. Experience in and knowledge of Meteorology is very helpful for this position.

#### Areas of expertise:

- Fluid Mechanics: studies the properties of liquids and gases
- Thermal Science: the physical study of heat and its properties
- · Meteorology
- · Aeronautics

#### **Additional Resources:**

- American Institute of Aeronautics and Astronautics http://www.aiaa.org
- Earth to Orbit: Engineering Design Challenges http://eto.nasa.gov/
- Graduate Student Researchers Program http://spacelink.nasa.gov/Instructional.Materials/NASA.Educa tional.Products/Graduate.Student.Researchers.Program.Brochur e/.index.htmlt
- MATHCOUNTS Competition http://mathcounts.org/
- Minority University Research and Education Programs http://mured.nasaprs.com/
- NASA Cooperative Education Program for college students http://spacelink.nasa.gov/Educational.Services/ NASA.Education.Programs/Student.Support/NASA.Cooperative .Education.Program/.index.html
- NASA Glenn Icing Branch http://icebox.grc.nasa.gov/
- National Engineer's Week http://www.eweek.org/
- National Oceanic and Atmospheric Administration http://www.noaa.gov/
- NASA SHARP Internship Program for highschoolers http://www.mtsibase.com/sharp/
- NASA Student Employment http://nasajobs.nasa.gov/stud\_opps/employment/index.htm
- NASA Student Involvement Program student contests http://www.nsip.net/index.cfm

### What can I do right now?

- Learn about meteorology through the weather stations available on the Web and through television.
- Interview pilots about the effects of weather on their aircraft's flight characteristics.
- Learn how to read the different types of aeronautical charts.
- Learn how to read and interpret the different types of weather data, charts, and maps available.
- · Continue broadening your computer skills.
- · Participate in National Engineer's Week activities.

- Revolutionary Vehicle Concepts and Systems student competition http://avst.larc.nasa.gov/competitions.html
- Sample debriefing from the Ice-Contaminated Tailplane Stall program http://www.grc.nasa.gov/WWW/K-12/IRT/TIPDeBrief/sld001.htm
- Tech-Interns.com http://www.tech-interns.com/
- Virtual Skies http://virtualskies.arc.nasa.gov
- Please take a moment to evaluate this product at:
- http://ehb2.gsfc.nasa.gov/edcats/educational topic
- Your evaluation and suggestions are vital to continually improving NASA educational materials.
- Thank you.



http://quest.nasa.gov/people/index.html